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## Radio Frequency Congestion

By Tom Kidd - October-December 2009

We are all familiar with overcrowding and traffic congestion. Most people in the United States experience long work commutes, jammed shopping malls, as well as long lines at restaurants, train stations and other locations where people frequently congregate.

However, congestion in these occurrences usually has peaks and valleys, and many times, people can arrange their schedules to avoid peak times. Some people living in rural areas have never experienced overcrowding.

The use and congestion of radio frequencies (RF) parallels that of roads, shopping malls and restaurants. While radio frequencies may be congested in some geographical areas, many geographical areas of the world and of the United States rarely, if ever, experience frequency congestion.

Natural resources such as oil, coal and precious metals are limited or finite and are in high demand; similarly, radio frequencies from the electromagnetic spectrum are also in high demand.

However, radio frequencies have one significant difference when compared to those other resources. Radio frequencies are instantaneously recyclable; the use of a frequency to communicate between radio devices does not deteriorate or consume that frequency.

Because of this radio frequency characteristic, radio frequencies can be shared and reused worldwide. Consequently, due to the ability to reuse and renew radio frequencies, congestion is generally limited to geographical areas where population density is high. This means that the preponderance of RF congestion is experienced at specific, geographical locations and predictable times that directly correlate to the typical use of wireless capabilities and devices.

For example, radio frequency use surges in the morning as people commute to work, during the commute home and into the early evening.

But not all spectrum usage is predictable. For the Navy and Marine Corps, unanticipated congestion within certain frequency bands is increasing. The requirement for 24/7 operations places unique demands on the use of radio frequencies, and new requirements for sensor and unmanned aerial system capabilities now strain available RF resources.

This RF congestion has reached the point where some strategic and tactical operations, such as use of unmanned aerial systems, must be scheduled to avoid frequency fratricide with other UAVs and other RF equipment operating within the same geographical area.

RF congestion is not going to diminish anytime soon. The use of RF-enabled capabilities continues to increase. However, there are actions that can be taken by warfighters and acquisition officials to minimize RF congestion.

Warfighters should always make their RF requirements known to responsible spectrum planning and operations personnel and always use only radio frequencies that have been provided by such personnel.

Acquisition officials should always consider radio frequency use from the warfighter's perspective when developing or acquiring systems and equipment.

Spectrum is a resource in high demand throughout the world. Use of the spectrum fuels the economy and enables a plethora of Navy and Marine Corps capabilities. While radio frequency congestion is a reality for Sailors and Marines, employing spectrum-dependent equipment in a congested environment can be managed if warfighters and acquisition officials recognize the risks and challenges associated with its use.



**INDIAN HEAD, Md. (March 6, 2009)**  
Personnel at the Navy Explosive Ordnance Disposal (EOD) Technical Division, Indian Head, Md., demonstrate how radios and walkie-talkies send out frequencies that could detonate improvised explosive devices. U.S. Navy photo by Mass Communication Specialist 2nd Class Jhi L. Scott.

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Online ISSN 2154-1779; Print ISSN 1047-9988  
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